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ABSTRACT

The use of the Wechsler Intelligence Scale for Children, Third Edition (WISC-III) and its interpretation in educational use are discussed. To measure intelligence, Wechsler believed one must measure the various aptitudes that contribute to the total behavior of the individual. The WISC-III has six verbal subtests and seven performance subtests. The verbal intelligence quotient (VIQ) is obtained by adding the scaled scores of all the verbal subtests except Digit Span, and the performance IQ (PIQ) is derived from five of the performance subtests. The PIQ is not as good a predictor of school achievement as is the VIQ. Indexes derived from the WISC-III subtests include: (1) verbal comprehension; (2) perceptual organization; (3) freedom from distractibility; and (4) processing speed. Subtest scatter and possible causes for significantly high and low subtest scores are explored and include reasons for differences between VIQ and PIQ. Factors that have been identified based on the WISC editions are listed, and ways in which subtest scores may suggest possible brain damage and emotional disturbance are reviewed. A worksheet is described that can enable the evaluator to examine a number of WISC-III factors for making placement and curriculum recommendations. (Contains 44 references.) (SLD)

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INTERPRETATION OF THE WISC-III AND ITS SUBTESTS

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EDUCATIONAL INTERPRETATIONS OF THE WISC-III
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INTERPRETATION OF THE WISC-III AND ITS SUBTESTS

WECHSLER'S DEFINITION OF INTELLIGENCE

Intelligence is not always adaptive, nor does it always involve verbal abstract reasoning. It is multidimensional, multi-faceted and can be determined in a variety of ways (Wechsler, 1981, p.8). Intelligence, according to Wechsler, is an overall global ability or competence which is expressed in many ways and enables the individual to deal with and cope effectively with his/her environment and its challenges. Intelligence can be inferred from performance on a series of different tasks. Wechsler viewed intelligence as a function of the individual's personality. Intelligence is responsive to many factors of the environment in addition to those included under the concept of cognitive abilities.

Wechsler noted a difference between intelligent behavior and intellectual ability (Matarazzo, 1972, p. 72-77). Emotional states can affect intellectual performance. In order to behave intelligently, one must rely on many factors--memory, reasoning, cognitive skills, and sequencing ability (Wechsler, 1981, p.8). These factors are utilized in different ways at different times in varying amounts. To measure intelligence one must measure the various aptitudes which contribute to the total behavior of the individual. Wechsler settled on eleven subtests for the Wechsler Adult Intelligence Test-Revised (WAIS-R) and twelve for the Wechsler Intelligence Scale for Children (WISC-R) which seemed to best measure one's global intelligence. In the 1930's Wechsler organized these into his new scale which he believed would best measure the global concept of intelligence. Wechsler did not view intelligence as a single ability, but:

> Intelligence, as a hypothetical construct, is the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his/her environment (Matarazzo, 1972, p. 79).

INTRODUCTION TO THE WECHSLER TESTS

The Wechsler Intelligence Scale for Children-Third Edition (WISC-III) has a long history, dating back to the pioneer work of David Wechsler in the 1930's. At that time the primary intelligence measuring instrument was the Stanford-Binet (S-B). Although it (and several other instruments) ranged into the adult level, Wechsler thought it inappropriate for the measurement of adult intelligence.

VERBAL SUBTESTS

Information The Information (IN) subtest is a measure of general cultural knowledge and acquired facts (Sattler, 1974; Blatt and Allison, 1968).

Similarities The Similarities (SI) subtest is a measure of abstract, logical thinking and reasoning (Sattler, 1974). Concept formation is also required.

Arithmetic The Arithmetic (AR) subtest is a measure of numerical accuracy, reasoning and mental arithmetic ability (Sattler, 1974).

Vocabulary The Vocabulary (VO) subtest is a measure of the student's verbal fluency, word knowledge, and word usage (Sattler, 1974, p.179).

Comprehension The Comprehension (CO) subtest is a measure of the student's social knowledge, practical judgment in social situations, level of social maturation, and the extent of development of moral conscience (Sattler, 1974, p.176).

Digit Span The Digit Span (DS) subtest is a measure of short-term verbal memory and attention.

PERFORMANCE SUBTESTS

Picture Completion The Picture Completion (PC) subtest is a measure of a student's ability to recognize familiar items and to identify missing parts. The student's task is to separate essential and nonessential parts from the whole (Sattler, 1974, p. 182).

Coding The Coding (CD) subtest measures visual-motor dexterity, associative nonverbal learning, and nonverbal short-term memory. Fine-motor dexterity, speed, accuracy and ability to manipulate a pencil contribute to task success. Perceptual organization is also important.

Picture Arrangement The Picture Arrangement (PA) subtest measures the student's ability to interpret action as depicted by pictures, to recognize their sequence in a story, and to arrange these in sequential order to tell a story (Sattler, 1974, p. 183).

Block Design The Block Design (BD) measures the ability to analyze and synthesize an abstract design, and then reproduce the design from colored plastic blocks (Taylor, 1961, p. 408; Sattler, 1974, p. 185).

Object Assembly The Object Assembly (OA) subtest is a measure of the ability to visualize the component parts of a

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concrete object and reassemble these parts into the whole (Sattler, 1974, p. 186).

Symbol Search This new subtest is optional, but is one component of the Processing Speed Index, and should be routinely administered. Perception and recognition are two prime requirements. The symbols are geometric forms, rather than familiar letters or numbers.

Mazes The Mazes subtest measures planning ability, perceptual organization, visual-motor coordination, and self-control.

THE IQs AND INDICES

The Verbal IQ (VIQ) is obtained by adding the scaled scores of all the Verbal subtests except DS. The VIQ reflects the verbal ability of the subject and as a result reflects the language and general culture of the United States, more so than the Performance IQ (PIQ). It is a good predictor of school achievement. The VIQ correlated well with the old Stanford-Binet Form L and Form L-M.

The VIQ is language specific. Because the VIQ reflects language and verbal skills, students who do not understand the English language well are at a distinct disadvantage on the VIQ. Children with hearing and speaking problems also are at a disadvantage on the VIQ. In addition, those students who are from an environment where there is not much verbal stimulation are at a disadvantage. For these students, the VIQ would not be an appropriate measure of ability.

The Performance IQ (PIQ) is composed of five Performance subtests, PC, CD, PA, BD and OA. In some cases the SS may be substituted for the CD subtest when it is invalidated. The MZ subtest is a supplementary subtest and is optional. As its name implies, the PIQ is not as loaded with verbal and cultural content as the VIQ. One could obtain a valid PIQ without the subject speaking a word. The PC and PA subtests are culturally anchored, but the remaining subtests are not, with the possible exception of the OA. Even the OA is "culture fair" to some extent. The PIQ is a closer estimate of Cattell's fluid ability than the VIQ. Selected subtests of the Performance Scale are even more of a closer estimate of Cattell's fluid ability (BD, OA, CD, MZ and SS).

Because of the "culture fair" nature of the PIQ, students who have a verbal or language problem may score higher on the PIQ than the VIQ. The same is true for children who come from an environment or culture outside the mainstream American culture. When this difference is 15 or more points higher, then the difference is significant.

The PIQ is not as good a predictor of school achievement as the VIQ, and correlations between the PIQ and achievement tests are generally lower than those of the VIQ.

Verbal Comprehension: The Verbal Comprehension (VC) Index has been found by several researchers and has been reported as the VC factor (Lutey, 1977; Cohen, 1959; Kaufman, 1975). The same factor was found on the WISC-III and labeled as an Index.

The VC factor or Index is defined as that measure of verbal knowledge that is retained from formal education (Lutey, 1977); and a measure of verbal knowledge and comprehension, including knowledge obtained by formal education and knowledge that reflects application by the child of verbal skills in new situations (Kaufman, 1975).

A low VC score may indicate a lack of exposure to the environment, poor education, a lack of cultural and educational opportunities, poor verbal skills, or some other verbal-cultural-educational problem. There may be a physical cause, such as a hearing and/or visual problem, a speech problem, or some other problem.

A high VC score may indicate extensive exposure to the environment, education or culture. It may also reflect superior cultural and educational opportunities, good verbal skills, and other similar causes, as well as a "gift of gab" on the part of the subject, perhaps to the point that he/she fools the examiner into giving credit when no credit is due.

Perceptual Organization: The Perceptual Organization (PO) Index has been reported by several researchers (Lutey, 1977; Kaufman, 1975; Cohen, 1959). Researchers have not reported the same subtests for PO. Cohen reported PC, PA, BD and OA; Lutey reported different subtests at different ages, and included at some time PC, PA, BD, OA, and MZ. Kaufman reported that PO was equal to the PIQ. The WISC-III uses PC, PA, BD, and OA.

Perceptual Organization is defined as the interpretation and organization of visually perceived materials (Lutey 1977); and Perceptual and organizational dimension, reflecting ability to interpret and/or organize visually perceived material (Kaufman, 1975). Certainly PO reflects visual interpretation and organization ability. It is affected by many different factors, such as physical visual problems (eye disorders), cerebral dysfunction, arm-motor involvement, visual-motor problems, and other similar disabilities. A low score on this Index indicates the possibility of a perceptual problem or inability to organize visually. Low scores on this Index should be investigated by other means. Many children may do well on the VIQ or VC, and do poorly on the PO Index. The authors have evaluated many children with this pattern. The PO Index can alert the examiner to the problem, but further investigation is necessary.

Freedom from Distractibility: Again the Freedom from Distractibility (FD) Index had been found by primarily the same researchers who found the VC and PO factors. Again, these researchers used different subtests to calculate the factor: Luty (1977) used DS, PA, OA, and MZ at different ages; Kaufman (1975) used AR, DS and CD; Cohen (1959) used AR

and DS. The WISC- III uses AR and DS.

Freedom from Distractibility has been defined as a measure of the degree to which performance is affected by distractions and the ability to attend and/or concentrate (Lutey, 1977); Ability to attend, concentrate, remain undistracted by outside factors, and may also involve numerical ability (Kaufman, 1975). A low score indicates an inability to concentrate or distractibility, and a high score indicates ability to concentrate or lack of distractibility. Distractibility may have several different causes, some physical, some cultural, and some environmentally, and a combination of these. Children who are physically healthy may have to learn to concentrate, pay attention, and filter out distracting influences. For some children, this may be a distinct part of their culture or environment. There could be physical causes for distractibility, such as cerebral dysfunction, similar to a lack of perceptual organization. A low score warrants further investigation, especially to confirm or eliminate a physical cause.

Processing Speed: The Processing Speed Index (PS) is new to the Wechsler Scales. The two subtests which make up this Index (CD and SS) involve timed activity with a pen. Both require recognition and judgment. The CD subtest requires short term non-verbal memory, while the SS subtest requires recognition of identical symbols. Both require the subject to process information within a time limit and to be correct in this matter. Both require the subject to recognize a symbol or number. Speed is important, and the subject who is slow will be at a definite disadvantage. Often theexaminer can recognize if the subject is under time pressure and note anxiety.

There are many school activities which involve processing speed, such as matching words, objects, parts, letters, and matching parts with words or letters, or perhaps with other parts. Many map exercises require this skill. Other similar skills involve processing speed.

SUBTESTS, FACTORS, INDICES, AND IQs

SUBTEST SCATTER

Intrasubtest Scatter: Intrasubtest (internal) scatter refers to an irregular pattern of responses in which a child obtains credit for a basal item, then misses items, then obtains credit, etc. When a child begins to miss items, he/she will normally make only an occasional correct response. This latter pattern of scatter is not significant. The concept of internal scatter is not applicable to Digit Span, Object Assembly, Coding, and Mazes subtests. It is possible that internal scatter may indicate the presence of greater ability than is indicated by the score.

Intersubtest Scatter: Differences between subtest scaled scores will occur on almost every protocol. These differences are usually only three or four scaled score points. Wechsler (1991, p. 264) presents a table of differences between scaled scores significant at the .15 and .05 level of confidence. These range from a low of 2.69 to a high of 4.00 at the .15 confidence level for thirteen subtests administered, and from a low of 3.16 to a high of 4.58 at the .05 confidence level for thirteen subtests administered. As a general rule, a difference of 4.5 between two subtests would be significant at the .05 level. (Remembering this figure will eliminate constant references to the table.) Thus if two subtests have a difference of 4.5 scaled score points, the difference is statistically significant, and the child probably has more ability in one subtest area than in the other. Kaufman (1976) found that the WISC-R profiles of normal children exhibited much scatter. Normative tables were devised to help psychologists evaluate the test scatter for an exceptional individual or group.

External Scatter between a Subtest Scale Score and the Mean Average of Scaled Scores

A more useful scatter analysis can be made be determining if the scaled score of a subtest is significantly different from the mean of all the scaled scores. One computes the mean of the scaled scores by dividing the sum of the scaled scores by 10 (excluding the Digit Span, Mazes and Symbol Search scaled scores).

A difference of +-3 from the mean of the verbal subtest of any verbal subtest would be significant at the .05 level, and a difference of +-4 would be significant at the .01 level. The same would apply for the Performance Scale. Therefore, by using a difference of +-3 from the mean scaled scores of the Verbal or Performance Scales, one could easily determine whose subtests in which the child shows significant ability or weakness. Those areas of significant weakness deserve special attention as they may suggest the need for remedial techniques. Areas of significant strengths also deserve special attention and need to be recognized and further encouraged, as they may form the basis for compensatory processes.

Possible Causes for Significantly High and Low Subtest Scores

Cooper (1982) and Stellern (1982) list possible causes for significantly high and low subtest scores. These causes are not all inclusive since other causes may also influence the low or high scores. However, there is no sure method of determining what is the cause of these significantly high or low scores. While most of these causes are clinical in nature, many have educational implications. The psychologist must examine these possible causes and make a tentative decision as to the possible cause(s).

Possible Causes of Significantly High Subtest Scores

Information: Good long term memory; good verbal facility; excellent exposure to the culture and environment; good educational background; ability to organize verbal material; ability to learn and recall specific facts; obsessive- compulsive personality; good auditory input.

Similarities: Ability to perceive verbal relationships, especially abstract relationships; very high scores may indicate some removal from reality and involvement in an over-ideational approach to surroundings; excellent verbal facility; good logical thinking; obsessive-compulsive personality; paranoid personality.

Arithmetic: Good ability to focus attention on the task; good ability to do simple calculations; excellent short-term memory; freedom from distractibility; good educational background; obsessive-compulsive personality; sometimes a paranoid personality.

Vocabulary: Good verbal facility; a well developed command of the language; ability to communicate well; ability to express oneself well; good exposure to the environment; rich cultural background; good educational background; an obsessive-compulsive personality; a paranoid personality.

Comprehension: A well developed social knowledge; ability to get along with others; good verbal ability; excellent social observation ability; ability to know and accept the rules of society; a paranoid personality.

Digit Span: Excellent short term memory; ability to attend; ability to concentrate; ability to reorganize verbally; low anxiety; excellent auditory facility; alert; a paranoid personality.

Picture Completion: Ability to attend to detail; good visual memory; ability to concentrate; alertness to the visual aspects of the environment; possible paranoid tendencies.

Picture Arrangement: Ability to sequence well; ability to note action, understand consequences of action; ability to note detail; good social knowledge; knowledge of the social environment.

Block Design: Good nonverbal reasoning ability; good perceptual organizational ability; for the older child, rapid visual motor coordination; good nonverbal reasoning skills; perfectionist personality.

Object Assembly: Good visual-motor coordination; good holistic, visual integrative style of reasoning; good visual memory; rapid construction of the items; a perfectionist; sometimes the ingratiating con man.

Coding: Good non-verbal memory; ability to learn non-verbal material; rapid eye-hand coordination; good perceptual skills; ability to sequence; good pencil facility; a perfectionist personality.

Mazes: Ability to plan ahead; good perceptual skills; good visual-motor ability; good eye-hand coordination; a perfectionist personality.

Possible Causes for Significantly Low Subtest Scores

Information: Poor memory; low socio-economic conditions; poor cultural background; limited educational background; impoverished verbal facility; speech defect; verbal output disorder; poor reality testing; repression; auditory input problem.

Similarities: Poor reasoning ability; weak abstract reasoning and thinking skills; poor logical thinking skills; poor verbal facility; concrete thinking skills; inability to deal with ideas on a symbolic level; speech defect; poor reality testing; delinquency; verbal output disorder; auditory input problem.

Arithmetic: Poor calculation skills; poor short-term verbal memory; inattention; distractibility; poor concentration; low facility with numbers; inability to deal with the concrete; anxiety; poor reality testing; verbal output problem.

Vocabulary: Poor verbal facility; limited educational background; social retreat and/or withdrawal; speech defect; auditory disorder; non-standard cultural background; delinquency; poor reality testing; auditory input problem; verbal output disorder; non-standard English usage.

Comprehension: Low social intelligence; low social understanding; socially isolated; poor verbal skills; speech defect; inability to plan; delinquency; poor common sense; poor reality testing; auditory input problem; verbal output disorder.

Digit Span: Poor short-term verbal memory; poor reorganizing ability; inattention; distractibility; poor concentration; anxiety; auditory deficit; inability to sequence; anxiety; thought process difficulty; sequential memory disorder; verbal output disorder.

Picture Completion: Incapability to attend and concentrate; inability to note detail; anxiety; repression; poor visual memory; inability to note detail; inadequacy to note aspects of the environment; poor reality testing; depres-

sion; visual input disorder; visual figure-ground disorder.

Picture Arrangement: Inability to sequence; poor social knowledge; inadequacy to note action and plan of action; lack of social skills; withdrawal; possible poor empathy; impulsive; inability to note detail; incapacity to respond to time pressure; anxiety; depression; poor reality testing; poor visual-motor coordination; visual input problem.

Block Design: Poor perceptual skills; poor visual motor coordination; inability to deal with abstract; deficient non-verbal reasoning; visual problems; inattention; possible cerebral dysfunction; anxiety; depression; visual motor coordination; figure-ground disorder; visual input disorder.

Object Assembly: Poor visual memory; poor visual-motor coordination; inattention; perceptual difficulties; inability to perform under time pressure; possible cerebral dysfunction; anxiety; depression; poor reality testing; figure-ground disorder; visual input disorder.

Coding: Poor non-verbal memory; poor visual-motor coordination; messy; inability to handle a pencil; inability to sequence; inattention; distractibility; low motivation; inability to operate under time pressure; visual input problem; possible cerebral dysfunction; anxiety; depression.

Mazes: Poor visual motor coordination; impulsiveness; inability to handle a pencil; inability to plan ahead; poor visual ability; some possible cerebral dysfunction; anxiety; depression; visual input problem; visual figure-ground disorder.

QUALITY OF ANSWERS

On three subtests, Similarities, Vocabulary and Comprehension, correct responses may receive one or two points. A 2-point answer indicates a greater degree of depth of understanding; usually deals with the abstract. A 1-point answer indicates a more limited understanding of the concept which the item is attempting to measure and is usually more concrete.

A score of 10 on a subtest consisting mainly of 1-point answers shows a wider range of interest and knowledge, but at a lower level of understanding and functioning than a score of 10 consisting mainly of 2-point answers. The later, however, indicates a greater depth of understanding, even though the range of interest and knowledge is restricted.

The pattern of score values often obtained is a series of 2-point answers, following by 1-point answers. A younger child will have fewer 2-point answers and will begin making 1-point answers earlier. One must take into consideration the age of the child, as some younger children will not make any 2-point answers. Frequently, the mentally handicapped will receive very few 2-point answers, as they tend to be more concrete in their thinking.

DIFFERENCES BETWEEN THE VERBAL AND PERFORMANCE IQs

Verbal IQ 15 or More Points Greater than Performance IQ:

Research that has evaluated children diagnosed as having organic problems or minimal cerebral dysfunction has found significant Verbal-Performance differences in favor of the Verbal IQ. Mordock and Begon (1968) using several groups of brain dysfunction children, found that the VIQ>PIQ children had more behavior problems. Although many believe that a VIQ>PIQ is a possible indicator of minimal brain dysfunction, the research has proven equivocal. One cannot make even a tentative diagnosis on the basis of this difference.

Because a high Verbal Scale reflects greater verbal abilities, many have felt that this will be reflected in higher verbal achievement in such areas as reading; this is not necessarily the case.

A perceptual-motor problem is often cited as a cause of the Verbal > Performance IQ difference. Kinsborne and Warrington (1963) found failure of finger differentiation and order, difficulty in arithmetic, significant retardation in right-left orientation, and mechanical and constructional difficulty in drawing, copying, etc. The researchers also found that these children seldom had language and speech problems; frequently had difficulty in left-right orientation, and usually had birth injuries, finger differentiation and order difficulty, and difficulty in copying words neatly. Many of these phenomena suggested a visual-motor perceptual problem.

Another possible explanation for obtained Verbal > Performance differences is that the home environment may place a greater emphasis on verbal achievement.

Performance IQ 15 or More Points Greater Than Verbal IQ:

There is considerable research on children obtaining greater Performance Scale IQ than Verbal Scale IQ. Many of these individuals have a language deficiency. Children with a foreign language background, although bilingual, tend to score higher on the Performance Scale. Research on Mexican-American and Puerto Rican children (Hewitt & Massey, 1969; Valerco & Brown, 1963; Killian, 1971) substantiate this finding.

Mentally retarded children frequently obtain higher Performance than Verbal IQs (Alper, 1967; Baroff, 1959; Newman

& Loos, 1953; Pastovic & Guthrie, 1951; Sinagawa, 1960; Webb, 1963). In many cases the mean difference is significant. Possible causes cited are lack of verbal abilities (i.e. verbal mediators), environmental differences, and more highly developed manual skills. When the Performance Scale is above the mentally retarded range, the child may not be mentally retarded, although the Full Scale IQ may fall in this range.

Weiner (1969) termed children with a large Verbal -Performance discrepancy in favor of the Performance Scale as "language-deficient." It was concluded that in language-deficient children sensory modality tasks play an important role in cognitive functioning.

Children with behavior and emotional problems often have a significant V-P difference. Juvenile delinquents often obtain PIQ>VIQ (Camp, 1966; Coroloto, 1961; Harris, 1957; Henning & Levy, 2967; Kaiser, 1964; Richardson & Surko, 1956; Smith, 1969; Wiens, Matarozzo, & Grover, 1959). Other researchers, however, have not found this difference (Frost & Frost, 1962; Talbot, 1960).

Underachievers tend to do better on the Performance Scale (Coleman & Rasoff, 1963; Jenkins, Spivack, Levine, & Salvage, 1964; Landrum, 1963). Generally, the lower scores are in ares which are school-related, such as Information and Arithmetic.

SUMMARY

In summarizing the VIQ-PIQ differential, no specific diagnostic implication predominates. The 15 points necessary for significant difference cannot be used solely for diagnostic purposes, but it does signify that serious problems exist that may warrant further evaluation. A 10-14 point difference should alert the examiner to possible problems, while any difference below 9 points should not be considered significant. Possible reasons for these differences have been suggested, although determination of the actual reason will require direct investigation on the part of the psychologist.

FACTOR SCORES

Because many subtests of the WISC-III measure similar ability dimensions to varying degrees, they may be combined into composite scores reflecting factors. Cohen (1959) was one of the first to establish these factors to aid in the interpretation of the WISC. Four Factors were derived: Verbal Comprehension, Perceptual Organization, Freedom from Distractibility, and a g factor. Various age group obtained different factor loading and subscale composition. Other researchers have reaffirmed the factor structure and new factors have been proposed. The WISC-III has incorporated three of Cohen's factors into Indexes consisting of subtests: Verbal Comprehension: Information, Similarities, Vocabulary and Comprehension; Perceptual Organization: Picture Completion, Picture Arrangement, Block Design, and Object Assembly; Freedom from Distractibility: Arithmetic and Digit Span. One new Index has been added: Processing Speed, consisting of the Coding and Symbol Search subtests. To determine the deviation score of each index, one adds the scaled scores of those subtests comprising the index and proceeds to a table.

The following factors have been identified by researchers based on the WISC and WISC-R:

Ability to Respond when Uncertain--a willingness to make a response when one is not certain of the correctness of the answer. PC,OA,MZ

Acquired Knowledge--general cultural and environmental knowledge which has been acquired, often without direct instruction, but has been taught in schools. IN,AR,VO

Attention Span--the length of time one can attend to an item, thing or concept; similar to concentration. DS,PA,CD

Cognition (Guilford)--awareness, immediate discovery, rediscovery, or recognition of information in the various forms; comprehension or understanding. (Sattler). SI,AR,VO,PC,BD,OA

Cognition Style Field Dependence-Field Independence--a person who can "break up" easily an organized perceptual field and can then easily separate an item from its context is field independent. Those individuals who readily accept the prevailing field or context and have difficulty separating an item from its context are called field dependent. (Lutey, 1977) PA,BD,OA

Concentration--the ability to attend, pay attention, study items, exclude other stimuli. AR,PC

Convergent Production (Guilford)--the production of information from given information where the emphasis is on achieving unique or conventionally accepted best outcomes. (Sattler, 1981). PA,CD

Cultural Opportunities--the degree to which one has opportunities to meet, acquire, assimilate, and participate in and with the culture. IN, VO

"Culture fair" Ability--similar to Cattell's fluid intelligence, this is ability, aptitude or intelligence which is not overly influenced by the culture. BD,OA,CD,MZ

Degree of Abstract Thinking--ability to think and reason in abstract terms; ability to form verbal concepts. SI, VO

Distinguish Essential from Nonessential Details--ability to separate out or indicate those portions of the whole which are necessary from those which are not. SI,PC,PA

Enrichment of the Environment--cultural opportunities, enrichment and mental stimulation provided by the cultural environment. IN,VO

Evaluation (Guilford)--reaching decision and/or making judgments concerning criterion satisfaction (correctness, suitability) of information. (Sattler, 1981). CO,PC,PA,BD,OA,CD

Extent of Reading and/or Interest--the amount, extent and variety of reading; the amount of divergence of interests. IN,SI,VO

Facility with Numbers--the degree and extent to which a client can calculate, manipulate, recall and use numbers. AR,DS,CD

Freedom from Anxiety--the degree to which a client does not have anxiety, worry or tension; the absence of anxiety. AR,DS,CD

Fund of Information--the amount of general information (acquired both from schooling and the environment.) IN,VO

Holistic (Right Hemisphere) Functioning--the degree of the functioning of the right hemisphere of the brain. PC,OA

Integrated Brain Functioning--the degree to which both hemispheres of the brain function together. PA,BD,CD,MZ

Learning Ability--ability to learn, acquire and retain knowledge, especially through verbal means. VO,CD

Long Term Memory--ability to remember and recall over a long period of time. IN,VO

Memory (Guilford)--memory, retention and/or storage of information with some degree of availability in the same form in which it was committed to storage (memory), and in response to the same cues in which it was learned. (Sattler, 1981). IN,AR,DS

Mental Alertness--ability to be alert, be attuned to the culture and environment, and ability to perceive quickly. AR,DS

Perceptual Organization--ability to perceive and organize visually, visually-motorally, and perceptually. PC,PA,BD,OA,MZ

Planning Ability--ability to plan ahead, see consequences of action and plan successfully. PA,MZ

Reasoning--the ability to assimilate facts and reach a logical conclusion. SI,AR,CO,PA,MZ

Reproduction of a Model--aptitude to copy or reproduce a model. BD,CD

Sequencing--aptitude to place concepts in a logical order. AR,DS,PA,CD

Social Judgement--ability to make evaluations and decisions in a social context, social intelligence, knowledge of socially acceptable decisions. CO,PA

Spatial--aptitude to visualize in space, two and three dimensions visualization, and perceive meaning. PC,BD,OA,MZ

Synthesis--aptitude to reconstruct, reproduce and combine or place in order, and perceive meaning. PA,BD,OA

Verbal Conceptualization--ability to conceptualize, respond, and acquire knowledge and information by verbal means. SI,VO,CO

Verbal Expression--ability to express concepts and ideas orally and verbally. SI,VO,CO

Visual Memory--aptitude to recall visually presented material. PC,CD

Visual-Motor Coordination--aptitude to perceive visually and carry out actions manipulatively. BD,OA,CD,MZ

Visual Organization without motor activity--ability to organize visually presented materials with a minimum of motor activity. PC,PA

Visual Perception of Abstract Stimuli--ability to perceive and integrate abstract stimuli presented visually. BD.CD

Visual Perception of Meaningful Stimuli--ability to perceive and interpret concrete, meaningful stimuli rather than abstract stimuli. PC,PA,OA

Working Under Exact Time Pressure--aptitude to perform accurately within a time limit. PA,BD,OA,CD

IDENTIFICATION OF POSSIBLE BRAIN DAMAGE

Although it should be emphasized that diagnosis of brain injury lies with medical personnel, the psychologist can recognize clues from the WISC-R, WISC-III and other psychological tests and can recommend a neurological evaluation. Most studies in this area have been conducted with the WAIS and the findings have been mixed, rather than conclusive. This is probably due to the heterogeneity of the brain injured population. Manifestations of brain injury will be diverse due to the location, extent and time of injury.

The WISC-III Manual reports one study with a sample of 30 children who were administered the WISC-III, the Tatutal Performance Test, Trails A and B, and the Finger Tapping Test from the Halstead-Reitan Neuropsychological Battery. Correlations among these tests are reported. The correlations with the WISC-III VIQ tend to be lower than those with the PIQ. The correlations with the Perceptual Organization, Freedom from Distractibility, and Processing Speed index scores have higher correlations with the neuropsychological scores than does the Verbal Comprehension Index score. The means of the VIQ, PIQ and FSIQ were all approximately the same. However, FDI and PSI index scores were significantly lower than the other index scores and the IQ scores, by nine to ten points. The subtest scale scores were not reported.

Almost all of the research found a VIQ>PIQ, with several studies showing this difference to be + 15 IQ points or more. However, some studies found the PIQ>VIQ. The VIQ>PIQ by +15 IQ points is considered a positive sign for possible brain damage. According to many studies, the BD subtest tends to be the most sensitive subtest to identify possible brain injury and tends to be the lowest subtest. Other subtests which tended to be low are the OA, CD and DS. Two triads seem to emerge: BD, OA, and CD; and BD, DS and CD. The means of these two triads tend to be significantly below the level expected.

The WISC-R can also give some clues to the presence of possible brain injury. Sattler (1982) summarized many of these signs as follows:

1. Similarities - difficulty in abstracting essential from non-essential attributes.
2. Digit Span - significantly higher on digits forward than digits backward.
3. Picture Completion - one of the highest of the subtest scaled scores.
4. Block Design - low subtest scaled score.
5. Object Assembly - difficulty in integrating the objects, motor problems and low subtest scaled score.
6. Coding - perseveration, rotation, extreme caution and slowness, and low subtest scaled score.
7. Verbal IQ - Performance IQ > 10+. Possibility of Performance IQ > Verbal IQ for those with left hemisphere damage.

In summary, the following signs can be considered in identifying possible brain injury:

1. VIQ >PIQ by + 16 or more IQ points.
2. BD significantly below level expected and one of the lowest subtest scaled scores.
3. (BD+OA+CD)/3 significantly below level expected.
4. (BD+DS+CD)/3 significantly below level expected.
5. VO> total mean or scaled scores.

It is important to remember that the presence of any or all of these signs does not diagnose brain injury but alerts the psychologist to this possibility.

IDENTIFICATION OF POSSIBLE EMOTIONAL DISTURBANCE

Since the development of the original Wechsler-Bellevue scales, there have been attempts to identify those with possible emotional disturbance using these scales. For the most part, results of these attempts have not been conclusive and have been somewhat disappointing. However, some patterns can be helpful in identifying clients with possible emotional disturbance.

Wechsler and Jaros (1965) found the following signs useful in identifying possible schizophrenia on the WISC.

1. PC>PA and OA>CD by 3 or more scaled score points. Both conditions must be met.
2. CO>AR and SI>AR by 3 or more scaled score points. Both conditions must be met.
3. The "3X3" sign. Three or more scaled scores must deviate from the mean of the scaled scores by 3 points or more.
4. VIQ > PIQ by 16 or more IQ points.

Dean (1977) found the following patterns useful in identifying children with possible emotional disturbance:

1. A positive "3x3" sign.
2. (PA-PC)>=3 and (AR-CD)>=3. Both conditions must be met.
3. (CO-AR)>=3 and (SI-AR)>=3. Both conditions must be met.
4. VIQ > PIQ by 16 or more IQ points.
5. Other minor signs:
   a. IN< Verbal subtest mean.
   b. SI> Overall subtest mean.
   c. AR< Overall subtest mean.
   d. VO=< Mean of Verbal subtests.
   e. IN lowest or second lowest in Verbal subtests.
   f. SI highest or second highest in Verbal subtests.
   g. CO< Overall subtest mean.
   h. PC> Mean of Performance subtests.
   i. CD< mean of Performance subtests.

Although these signs are not diagnostic, it has been the personal experience of one of the authors (Nicholson) that the Wechsler and Jaros signs, along with Dean's major signs, are accurate in indicating emotional disturbance about 40% of the time. A definite diagnosis of emotional disturbance must be determined by other means.

SHORT FORMA OF THE WISC-R

Short or abbreviated forms of the WISC have been used by psychologists to save professional time. There have been two basic procedures used for the shortened form. The first procedure is the Staz and Mogel (1962) model, originally used on the WAIS and later refined for the WISC-R by Hobby (1981). In this procedure every other item of most of the subtests is administered and the results doubled. This is then entered into the table to obtain a scaled score. The resulting scaled scores are summed to find the IQ's in the usual manner. The second procedure utilizes selected subtests which are administered in their entirety and then prorated to obtain IQ's. Originally the criterion for evaluating a short form was the extent to which it correlated with the IQs of the full administration. Resnick (1977) suggests the following criteria: (a) A significant correlation between the two forms; (b) nonsignificant t test between the two administrations, and (c) only a small percentage of IQ classification changes.

Several different subtests have been suggested to be used as short forms, ranging from a low of two to a high of six. Most of these have met at least one criterion proposed by Resnick. Most authorities felt that the technique was useful but should be used only for screening purposes.

McCloud and Nicholson (1983) studied the efficacy of WISC-R short forms with 327 students referred for psych ological evaluation. Both the selected subtests and Hobby procedure, a modification of the Staz and Mogel method, were used. They found that the power of accuracy was increased only slightly from four to six subtests. The authors concluded that administering only one, two or three subtests is not recommended. McCloud and Nicholson found the Hobby procedure to be more accurate in estimating the scale scores and IQ's than the selected scale scores in brief forms. Again there were differences between the fully administered WISC-R and Hobby's technique, and sometimes the t tests showed significant differences. As with using selected subtests to predict VIQ, PIQ and FSIQ, there were considerable individual case fluctuations. Internal scatter would often greatly affect the raw score, the interpolated raw score, the final sum of the scale scores, and the IQ's.

The authors concluded that there is no short cut in a complete diagnosis, especially with children who are suspected of being learning disabled or educable mentally handicapped. The use of a brief form, regardless of the model, is reserved for very special purposes, such as screening or rough estimates of general ability, and should not be used for general use, such as placement or diagnosis. If a brief form is used, this should be clearly stated in a report, the procedure used and the reason for the brief form. Diagnostic interpretations and recommendations made from a brief form do not have the same predictive value as those from a fully administered WISC-R. The same would apply to the WISC-III.

EDUCATIONAL APPLICATIONS OF THE WISC-III: WORKSHEET

The Worksheet described in this paper was developed by the authors and incorporates much of the research. Its completion enables the evaluator to systematically examine a number of factors influencing achievement, and provides a sound basis for making educational placement and curriculum recommendations.

INSTRUCTIONS FOR COMPLETION OF THE WORKSHEET

Page 1 Fill in the name, age, VIQ, PIQ, FSIQ, and each of the indices, Verbal Comprehension (VC), Perceptual Organization (PO), Freedom from Distractibility (FD), Processing Speed (PS), and each subtest raw and scaled score in the blanks as indicated. The total of the Verbal and Performance Scaled scores excluding Digit Span, Mazes and Symbol Search, are entered at the bottom of columns a and d.

Subtract PIQ from VIQ. If the absolute difference is > 15, refer to the appropriate program found in the Chapter 4 (14 or 15). Also note interpretations and possible reasons for this significant difference.

Next, enter the total of the subtest scaled scores (a+d) in the space provided. Divide this total by 10 and enter the mean of the subtests in the space provided (g). Two equations are used to identify subtest performance significantly above or below the Mean Scaled Score. In the first equation, subtract 2 from the mean of the subtests and round down the results. Any subtest with a scaled score equal to or lower than this result is significantly lower than the subtest mean. Compensatory activities will be based on these results and will be selected from the appropriate programed procedures in Chapter 4. Next, enter the mean of the subtests in the next equation and add two to the results and round up. Any subtest scaled score at or above this is significantly higher than the subtest mean. Although there are no programed recommendations for these subtests significantly above the subtest mean, they should be noted as strengths in the narrative of the report.

Two procedures can be used to determine the expected mental age and expected grade level procedure. One procedure uses the mean test age of the subtests averaged. This procedure requires the information in the WISC-III Manual. Compute this on page 1 and enter the information in the proper spaces on page 2.

Page 2 An alternate method of obtaining an approximate mental age, which is less accurate but simpler to use, involves reading the MA directly from Table 1, Table 2, or Table 3.

Table calculations are based upon the formula: MA= (IQxCA)/100

Various researchers have suggested one of the following procedures to find expected achievement level: Table 1 uses MA - 5.0; Table 2 uses MA - 5.2, and Table 3 uses MA - 5.5. The later formula is preferred by the authors. Choose the procedure to be used and go to the appropriate table.

Next subtract 5 (or 5.2 or 5.5 depending on your state or locally approved values) from the Verbal and the Performance Mean Test ages to find the present Expected Achievement Level for each scale.

To determine the Theoretical Achievement at Age 16 go to Tables 1, 2 or 3. Read down the IQ column of the table to the last row (16 years); the number in bold print is the expected grade achievement level at age 16. Do this for both the VIQ and PIQ.

Write the name of the achievement test used and fill in the grade equivalent, percentile and standard scores in the basic achievement areas--reading recognition (reading vocabulary), reading comprehension, spelling (written language) and mathematics. These results will be used to make comparison of achievement and ability on the second page of the worksheet.

Provision is provided for comparison of the four indices, and the VIQ, PIQ and FSIQ. Place the value of the four indices on the first column of lines 14, 15, 16 and 17. Make the subtraction from the VIQ, PIQ, FSIQ, VC, PO, FD and PS on the lines provided. A 16 point difference is significant. Indicate with an * those differences which are different. The psychologist may want to discuss these differences in the narrative.

Selected subtests can be combined to identify other factors that may affect learning. Space for the calculation of these subtest combinations appears on the front side of the Worksheet. Fill in the spaces provided for the scaled score value of each subtest and then add and divide by the numbers indicated. Of the four Indices, only the Perceptual Organization Index has programed recommendations. It is advised that visual perceptual problems be confirmed by other means. Scores in the perceptual area may be depressed because of low general ability or by slowness of response. In some cases, a false identification of a visual perceptual problem may be made.

Programed recommendations for compensatory activities are selected and indicated to the teacher in section III of the Interpretative Summary Sheet (page 4). To select the proper program, note those subtests that were significantly below the mean of the scaled scores. These subtests indicate specific areas in which the child could possibly benefit from remediation. Use the Mean Verbal Test Age to select and then indicate the proper developmental age remedial recommendations pertaining to verbal subtests and use the Mean Performance Test Age to select and then indicate proper developmental age recommendations for the performance subtests. For Perceptual Organization remedial techniques, one needs to consider the Performance Scale Age and the chronological age to make appropriate recommendations. These programed recommendations also appear in Chapter 4.

Actual class placement and provision for meeting special needs must now be considered. Information regarding present placement can be obtained from school records and conferences with teachers and counselors. Reasons for student referral for evaluation and supporting evidence should also be noted.

At the bottom on the second page of the Worksheet, fill in the expected grade equivalent from the calculations on the first page in the spaces provided using both the VIQ and PIQ results. Next fill in the actual grade equivalent (GE) results from the achievement test administered in the four basic achievement areas. Subtract the results. If this difference is negative, the student is overachieving based on his/her ability. If this difference is positive, the student is underachieving based on his/her ability. One may also want to compare actual grade placement with actual achievement using the same procedure.

One should expect that there should be some difference between theoretical and actual grade equivalents. A question arises when these differences become significant. The Department of Public Instruction in North Carolina published a guide to help determine whether the difference is significant or not. The following guide should be helpful:

Ranges of Learning Disability in GE Below Expected Achievement Levels

Grade	Mild	Moderate	Severe
	At level	Below level	Significantly below
K	0.0 - 0.5	0.5 - 0.9	0.9 and below
1	0.0 - 0.6	0.6 - 1.2	1.2 and below
2 - 3	0.0 - 0.9	0.9 - 1.3	1.3 and below
4 - 6	0.0 - 1.7	1.7 - 2.5	2.5 and below
7 - 12	0.0 - 2.5	2.5 - 3.3	3.3 and below

(North Carolina Department of Public Instruction, 1980).

Because of these problems with the grade equivalent procedure, many school systems are comparing the standard score on an achievement test with the IQ, known as Ability-Achievement Discrepancy. Most states now require the Ability-Achievement Discrepancy procedure and it is statistically sound. This procedure is easy to use, especially if the standard score of the achievement test has a mean of 100 and a standard deviation of 15. One just subtracts the standard score from the IQ. If this difference is +-10 points or less, achievement is at the level expected. If the difference is between +11 and +15, achievement is below the level expected but not significantly so. If the difference is greater than +16, then achievement is significantly below the level expected. If the difference is between -11 and -15, then achievement is above the level expected, but not significantly so. If the difference is above -16, then achievement is significantly above the level expected. Differences allowed for calculated expected achievement will vary according to state and local regulations. Calculations using the VIQ and the PIQ using the appropriate standard scores from the achievement test may be included on the second page of the Worksheet.

Page 3 Also included on page two of the Worksheet are signs for emotional disturbance and possible brain injury. Fill in the indicated subtest scaled scores, and perform the indicated calculations. One should then make a clinical judgment based on these calculations. One must remember that these are signs of possible brain injury and emotional disturbance, rather than actual diagnosis. One must refer to other instruments and observations for diagnosis.

The remainder of this page of the Worksheet may be used by the examiner to note more subjective observations of examinee behavior, quality of responses and patterns of responses for all of the subtests. One may want to comment on the following.

At the end of the Worksheet space is provided for comments on the behavior of the student during the evaluation. Things that the examiner may want to comment on could be rapport, level of cooperation, any aggression noted, any shyness noted, signs of distractibility and level of concentration, restlessness during the evaluation, etc. One may also want to comment on any unusual behavior. The WISC-III form provides space for comments during the evaluation. This form should be used for extensive notes.

Page 4 After the Worksheet has been completed, the examiner should use these notes and other information gathered during the evaluation to write the narrative of the report and make specific recommendations and interpretations. The narrative should include specific interpretations and recommendations that are useful to the classroom teacher. The relevant programed interpretations and recommendations are indicated on the Interpretive Summary sheet. Its five-part format allows the examiner to adopt a method of communicating these suggestions to the teaching staff, which is consistent with specific school system policy. The teacher should be provided a copy of Chapter 4 as a reference to the individualized recommendations made for all of the children he or she refers for a psychological evaluation. Chapter 4 can also be effectively used with parents to help the child outside of the school.

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